

538,580

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property  
Organization  
International Bureau(43) International Publication Date  
1 July 2004 (01.07.2004)

PCT

(10) International Publication Number  
**WO 2004/055936 A1**(51) International Patent Classification<sup>7</sup>:  
11/00

H01P 1/387,

(71) Applicant (for all designated States except DE, US):  
**KONINKLIJKE PHILIPS ELECTRONICS N.V.**  
[NL/NL]; Groenewoudseweg 1, NL-5621 BA Eindhoven  
(NL).

(21) International Application Number:

PCT/IB2003/005765

(22) International Filing Date: 9 December 2003 (09.12.2003)

(72) Inventor; and

(25) Filing Language:

English

(75) Inventor/Applicant (for US only): **PIETIG, Rainer**  
[DE/DE]; c/o Philips Intellectual Property & Standards  
GmbH, Weissshausstr. 2, 52066 Aachen (DE).

(26) Publication Language:

English

(74) Agent: **MEYER, Michael**; Philips Intellectual Property &  
Standards GmbH, Weissshausstr. 2, 52066 Aachen (DE).

(30) Priority Data:

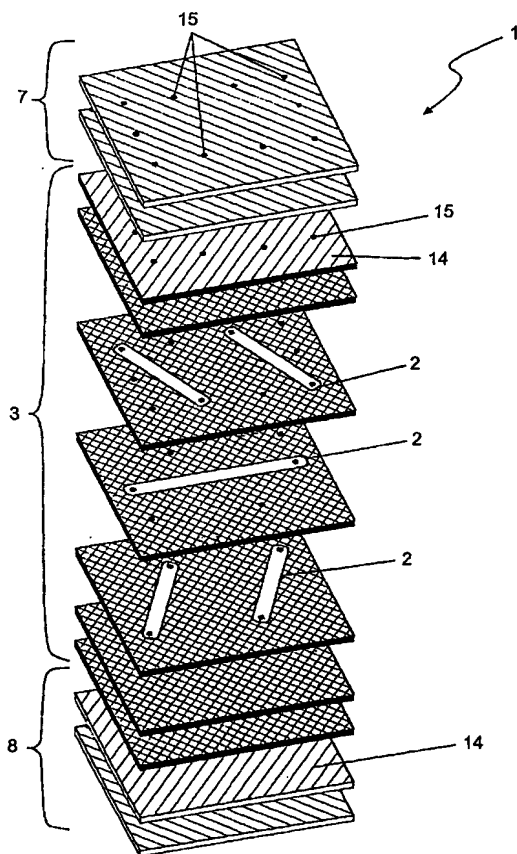
02102777.6

17 December 2002 (17.12.2002) EP

(81) Designated States (national): AE, AG, AL, AM, AT, AU,  
AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR,  
CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD,  
GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR,  
KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN,  
MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU,(71) Applicant (for DE only): **PHILIPS INTELLECTUAL  
PROPERTY & STANDARDS GMBH** [DE/DE]; Stein-  
damm 94, 20099 Hamburg (DE).

[Continued on next page]

(54) Title: NON-RECIPROCAL CIRCUIT ELEMENT



(57) Abstract: The invention relates to a non-reciprocal circuit element (1) having a plurality of strip conductor elements (2) insulated electrically from one another, which conductor elements are embedded in a multilayer core (3) of ferrimagnetic material and are arranged in superposed conductor planes in such a way that the conductor elements (2) cross over one another in at least one crossover area (4, 5). To provide such a circuit element, which is particularly cost-effective to produce and which is suitable in particular for use in mobile phones, the invention proposes that the core (3) comprises, at least in the crossover area of the conductor elements (2), hard magnetic material, which is permanently magnetized in a spatial direction perpendicular to the conductor planes.

WO 2004/055936 A1



SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA,  
UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

- (84) **Designated States (regional):** ARIPO patent (BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

**Published:**

- with international search report
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*